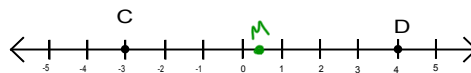


## 8-1 Midpoint and Distance Formulas



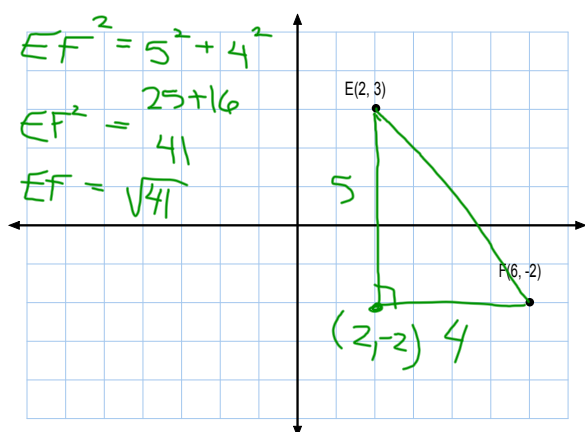
$$AB = |8 - 3| = 5$$

$$\text{midpoint } \frac{8+3}{2} = 5.5$$



$$CD = 7$$

$$\text{midpoint } \frac{1}{2}$$



$$EF^2 = 5^2 + 4^2$$

$$EF^2 = 25 + 16$$

$$EF^2 = 41$$

$$EF = \sqrt{41}$$

## Midpoint Formula

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Find the midpoint of:

A(4, 3)

B(-2, 5)

$$M(1, 4)$$

$$\frac{4+(-2)}{2}, \frac{3+5}{2}$$

M is the midpoint of AB. Find the other endpoint if:

A(8, 3)

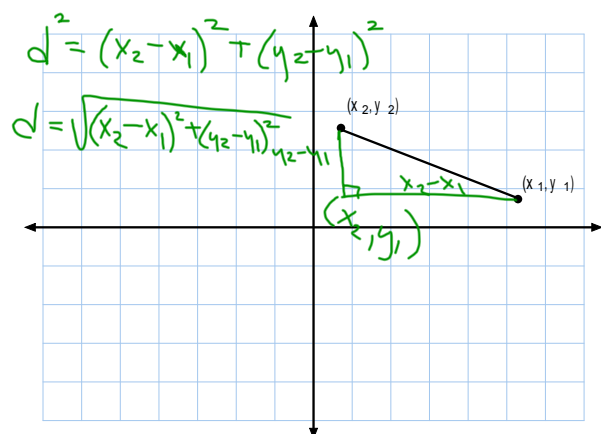
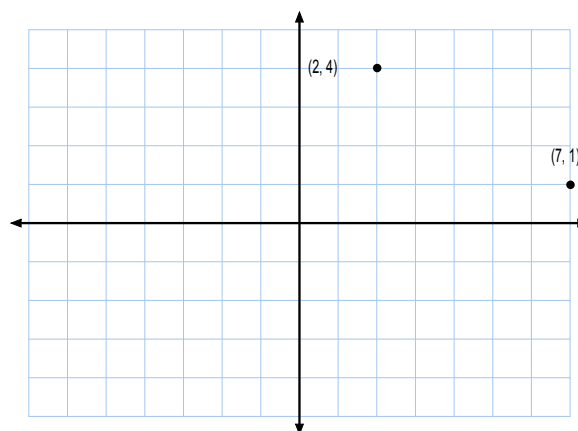
M(12, 5)

B( ? )

A(-1, 0)

M(-3, 5)

B( ? )



The Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Find the distance between:

(-1, 4) (2, -3)

$$d = \sqrt{(-1 - 2)^2 + (4 - (-3))^2}$$

$$d = \sqrt{9 + 49}$$

$$d = \sqrt{58}$$

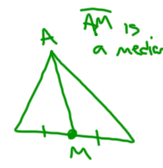
Find the distance between:

(2, -5) (3, 1)

$$d = \sqrt{(3-2)^2 + (1-(-5))^2}$$

$$d = \sqrt{1 + 36}$$

Median of a triangle --is a segment that connects a vertex and the midpoint of the opposite side.



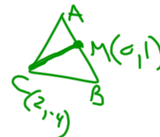
Example 1:

Find the length of the median from C to AB.

A(-3, 0)

B(3, 2)

C(2, -4)



$$-3+3, \frac{0+2}{2}$$

$$CM = \sqrt{4 + 25}$$

$$CM = \sqrt{29} \text{ units}$$

Example 2:

Find the length of the median from A to CB.

A(-3, 0)

B(3, 2)

C(2, -4)

$$M\left(\frac{5}{2}, -1\right)$$

$$AM = \sqrt{\left(\frac{5}{2} + 3\right)^2 + (-1 - 0)^2}$$

$$= \sqrt{\frac{121}{4} + \frac{4}{4}}$$

$$= \sqrt{\frac{125}{4}}$$

$$AM = \frac{5\sqrt{5}}{2}$$

**HW**

p414-415

11-17, 25-33 odd, 36, 37